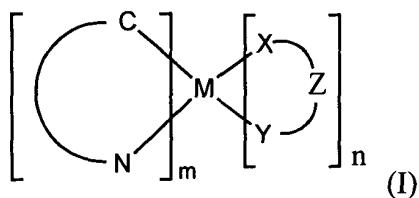


Claims

1. A compound represented by the Formula (I)



wherein



is a cyclometallated ligand,

M is a metal with an atomic weight of greater than 40,

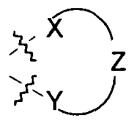
X and Y are each an independently selected from a heteroatom, heteroatom-containing group or heterocycle,

Z is a divalent linker,

Z is a group of the formula $JR'_pR''_q$

wherein J is hydrogen or a metal or a non-metal, R' and R" are independently, alkenyl, heteroaryl, hydroxy, alkoxy, aryloxy, amino, alkylamino, arylamino, sulfido, alkylsulfido, arylsulfido, phosphino, alkylphosphino or arylphosphino and p and q are integers between 0 and 2.

m and n are integers selected from 1 and 2 wherein the sum of n + m is 2 or 3,

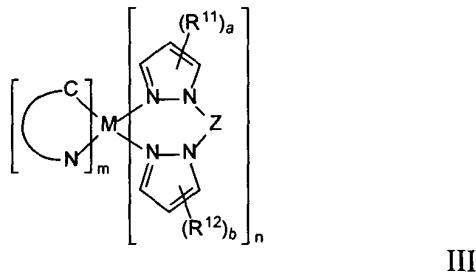


with the proviso that is anionic.

2. The compound of claim 1, wherein J is boron.
3. The compound of claim 1 wherein the heteroatom-containing group is selected from OR, SR, NR₂ and PR₂, wherein R is alkyl, aryl, or heteroaryl.
4. The compound of claim 3, wherein R is a C₁-C₆ alkyl, aryl, or heteroaryl.
5. The compound of claim 1, wherein R' and R" are heteroaryl.

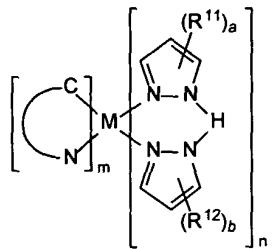
6. The compound of claim 5 wherein R' and R" are selected from the group consisting of alkyls, aryls, and pyrazoles and p and q are each 1.
7. The compound of claim 4 wherein R' is pyrazole, R" is a pyrazole and p and q are each 1.
8. The compound of claim 5 wherein X and Y are pyrazoles.
9. The compound of claim 5, wherein Z is hydrogen.
10. The compound of claim 1, wherein the heavy metal is selected from the group consisting of Ir, Pt, Pd, Rh, Re, Os, Tl, Pb, Bi, In, Sn, Sb, Te, Ag, and Au.
11. The compound of claim 9 wherein the heavy metal is Ir.
12. The compound of claim 9 wherein the heavy metal is Pt.

13. The compound of claim 1, having the Formula III:



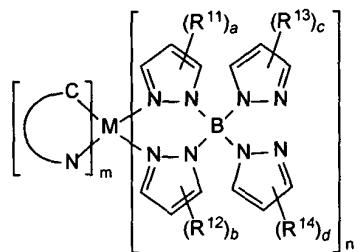
wherein each R¹¹ and R¹² is independently selected from alkyl, alkenyl, alkynyl, alkylaryl, CN, CF₃, CO₂R, C(O)R, NR₂, NO₂, OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group, and additionally, or alternatively, any two adjacent substituted positions together form, independently, a fused 5- to 6-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl, and wherein the fused 5- to 6-member cyclic group may be optionally substituted with one or more of alkyl, alkenyl, alkynyl, alkylaryl, CN, CF₃, CO₂R, C(O)R, NR₂, NO₂, OR, or halo; each R is independently alkyl, aryl, or heteroaryl; and subscript a and b are independently selected from 0, 1, 2, and 3.

14. The compound of claim 5, having the formula IV:



IV

15. The compound of claim 1, having the Formula V:



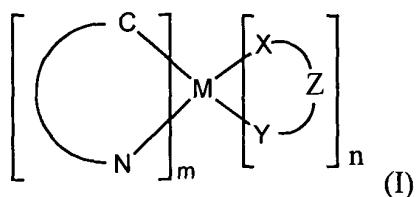
V

wherein each R¹¹, R¹², R¹³, and R¹⁴ is independently selected alkyl, alkenyl, alkynyl, alkylaryl, CN, CF₃, CO₂R, C(O)R, NR₂, NO₂, OR, halo, aryl, heteroaryl, substituted aryl, substituted heteroaryl or a heterocyclic group, and additionally, or alternatively, any two adjacent substituted positions together form, independently, a fused 5- to 6-member cyclic group, wherein said cyclic group is cycloalkyl, cycloheteroalkyl, aryl, or heteroaryl, and wherein the fused 5- to 6-member cyclic group may be optionally substituted with one or more of alkyl, alkenyl, alkynyl, alkylaryl, CN, CF₃, CO₂R, C(O)R, NR₂, NO₂, OR, or halo;

each R is independently alkyl, aryl and heteroaryl; and

subscript a, b, c, and d are independently selected from 0, 1, 2, and 3.

16. A compound represented by the formula (I)



wherein



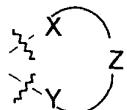
is a cyclometallated ligand,

M is a metal with an atomic weight of greater than or equal to 40,

X and Y are each an independently selected heteroatom-containing group or heterocycle,

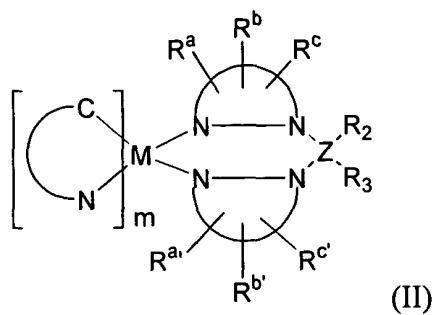
m and n are integers selected from 1 and 2 wherein the sum of n + m is 2 or 3,

Z is H or is denoted by $JR'_pR''_q$ wherein J is hydrogen or a metal or a non-metal, wherein J is selected from the group consisting of Al, Ga, In, Zn, Cd, Hg, Cu, Ag and Au. R' and R'' are independently H, alkyl, alkenyl, heteroaryl, halogen, hydroxy, alkoxy, aryloxy, amino, alkylamino, arylamino, sulfido, alkylsulfido, arylsulfido, phosphino, alkylphosphino or arylphosphino and p and q are integers between 0 and 2,



with the proviso that is anionic.

17. The compound of claim 16, wherein X and Y are heterocycles.
18. The compound of claim 17 wherein X and Y are pyrazoles.
19. The compound of claim 18 wherein R' is pyrazole, R'' is a pyrazole and p and q are each 1.
20. The compound of claim 16 wherein R' is selected from the group consisting of bidentate alkyl, aryl and carboxyl ligands and chelating coordination ligands, p is equal to 1 and q is equal to 0.
21. The compound of claim 16 wherein R' and R'' are selected from the group consisting of alkyls, aryls, and pyrazoles and p and q are each 1.
22. The compound of claim 16, wherein Z is hydrogen.
23. The compound of claim 16, wherein the heavy metal is selected from the group consisting of Ir, Pt, Pd, Rh, Re, Os, Tl, Pb, Bi, In, Sn, Sb, Te, Ag, and Au.
24. The compound of claim 23 wherein the heavy metal is Ir.
25. The compound of claim 23 wherein the heavy metal is Pt.
26. The compound of claim 16 having the formula (II).



wherein



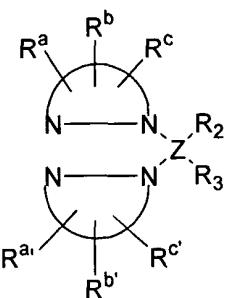
is a cyclometallated ligand,

M is a metal with an atomic weight of greater than 40,

Z is a divalent linker,

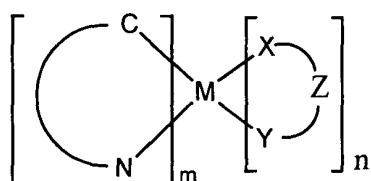
m is 1 or 2,

R_a, R_b, R_c, R'_a, R'_b and R'_c, if present, are selected from H, alkyl, aryl, heteroaryl, halogen, alkoxy, amino, alkylamino, arylamino, sulfido, alkylsulfido, arylsulfido, phosphino, alkylphosphino or arylphosphino,



with the proviso that is anionic.

27. A light emitting device comprising an organic layer, the organic layer comprising a composition represented by the structure:



wherein



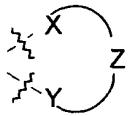
is a cyclometallated ligand,

M is a metal with an atomic weight of greater than 40,

X and Y are each an independently selected heteroatom-containing group or heterocycle,

Z is a divalent linker,

m and n are integers selected from 1 and 2 wherein the sum of n + m is 2 or 3,



with the proviso that is anionic.

28. The light emitting device of claim 27, wherein Z is represented by the general structure $JR'_pR''_q$ wherein J is hydrogen, a metal or a non-metal, R' and R'' are independently H, alkyl, alkenyl, aryl, heteroaryl, halogen, hydroxy, alkoxy, aryloxy, amino, alkylamino, arylamino, sulfido, alkylsulfido, arylsulfido, phosphino, alkylphosphino or arylphosphino and p and q are integers between 0 and 2.

29. The light emitting device of claim 28 wherein J is selected from the group consisting of H, Ag, Zn, Al, B, Ga, In, Cd, Hg, Cu, Au.

30. The light emitting device of claim 27, wherein X and Y are heterocycles.

31. The light emitting device of claim 30 wherein X and Y are pyrazoles.

32. The light emitting device of claim 28, wherein J is boron.

33. The light emitting device of claim 32, wherein X and Y are both pyrazoles .

34. The light emitting device of claim 33 wherein R' is pyrazole, b is equal to 0 and a is equal to 2.

35. The light emitting device of claim 28 wherein R' is selected from the group consisting of bidentate alkyl, aryl and carboxyl ligands and chelating coordination ligands, b is equal to 0 and a is equal to 1.
36. The light emitting device of claim 27 wherein R' and R" are selected from the group consisting of alkyls, aryls, and pyrazoles and p and q are each equal to 1.
37. The light emitting device of claim 27, wherein Z is hydrogen.
38. The light emitting device of claim 37, wherein X and Y are pyrazoles.
39. The light emitting device of claim 27, wherein the heavy metal is selected from the group consisting of Ir, Pt, Pd, Rh, Re, Os, Tl, Pb, Bi, In, Sn, Sb, Te, Ag, Au.
40. The light emitting device of claim 39 wherein the heavy metal is Ir.
41. The light emitting device of claim 39 wherein the heavy metal is Pt.
42. The light emitting device of claim 27 wherein at least one of X and Y is selected from the group consisting of OR, SR, NR₂, PR₂.
43. The light emitting device of claim 49, wherein R is selected from the group consisting of H, alkyl, aryl, heteroaryl, halogen, alkoxy, amino, alkylamino, arylamino, sulfido, alkylsulfido, arylsulfido, phosphino, alkylphosphino or arylphosphino.